

American Naturalists



Chapter Goals:

After completing this chapter, volunteers should be able to:

- Understand the history and current status of natural history as a discipline.
- Identify significant naturalists throughout American history and discuss their accomplishments.
- Describe the basic skills of a naturalist (e.g. observation, field journaling, species identification, sharing knowledge) and how to apply them in field studies.

Defining Natural History

As science and culture have changed, our understanding of the term “natural history” has also changed. In its earliest usage, natural history referred to the study of science in all its forms in order to differentiate it from ecclesiastical or political history. By the eighteenth century, natural history became a scientific subject. Today, natural history is a term that incorporates several scientific disciplines, mostly the study of living things, but sometimes including meteorology, paleontology, and geology. Defining natural history can be a problem. The word “history,” as it applies in this use, has nothing to do with the past. Instead, it means “description.” Therefore, natural history is a description of natural systems. In its earlier years, natural history was considered an analytical science. Marston Bates defines natural history as “the study of life at the level of the individual – of what plants and animals do, how they react to each other and their environment, how they are organized into larger groupings like populations and communities.” It is the study of the whole organism, rather than the parts such as physiology, biochemistry, and genetics. It is the study of nature in its entirety.

Definition of a Naturalist

A person who studies and teaches natural history is called a naturalist. However, there are a number of variations on that definition. For example, a naturalist is also defined as: “an advocate of the doctrine that the world can be understood in scientific terms,” “a biologist knowledgeable about natural history (especially botany and zoology); an expert in natural history,” “a person, often a scientist or writer, who studies and promotes nature;” or “someone who studies natural history, probably in the field rather than the lab.” Green defines a “Scientific Naturalist” as someone with an understanding of a group of organisms or ecological communities that includes

knowledge of all the organism's or system's special traits. The scientific naturalist uses this knowledge to create and conduct research.

In its early academic usage "naturalist" was used to refer to a person committed to studying nature: mineral, vegetable and animal. Later, "naturalist" was split into geologist, botanist and zoologist. Even then, "naturalist" was used interchangeably with Greek titles to define a scientist. A person could be called a zoologist as his or her title but would be called a naturalist to define how they conducted their work (primarily field-based). Naturalist also referred to the many non-academics that studied nature. They may be explorers, writers, teachers, or dedicated amateurs, but are all drawn together by a passionate interest in nature and natural systems. A naturalist possesses a great knowledge of organismal ecology, behavior, systematics, distribution, and life history. He or she uses knowledge to create ideas and hypotheses and develops intelligently designed research. Naturalists have passion and fascination for biodiversity and for the organisms that create that diversity.

A Brief History of Natural History

Natural history is commonly considered the progenitor of all natural sciences. It is the oldest science in Western civilization, dating back to Aristotle's observations of animals. The term "Natural History" was first seen in Pliny the Elder's master work *Historia Naturalis*. Ever since this time, natural history has sought answers to the basic questions about the planet's inhabitants. The 18th and 19th centuries and the beginning of British expansion saw natural history study become a formal, regulated discipline. After getting a start in Great Britain, natural history societies flourished across Europe as the British Empire began its exploration and colonization in tropical areas and as England continued its interest in the American colonies. By 1750, Carl Linnaeus developed his *Systema Naturae*, a monumental step that strengthened the field of natural history by creating a common language and taxonomic system with which to communicate. Soon naturalists trained in the Linnaean taxonomy, such as the Bartrams, Nuttall, and Townsend began their famous and intellectually profitable explorations. The incredible natural history text, *The Travels of William Bartram*, is an astonishing trip through the early landscapes of southeastern North America. His detailed descriptions of plants, animals, weather, people, and landscape are as fresh and exciting today as they must have been in his day. Amazingly, although many species' names have changed, the faithful species accounts allow the reader to identify each by pure description.

Natural history in the 18th century was not left to the trained specialist. Many early leaders such as George Washington and Thomas Jefferson were avid naturalists. They enjoyed nature study as a commonplace part of the educated gentry's life. Often they saw natural history as an expression of God's great works and therefore not only worthy of study but requiring study. One only needs to read Thomas Jefferson's papers to understand the importance that natural history study and

experimentation had in his life. When Thomas Jefferson commissioned Meriwether Lewis and William Clark for their epic journey of discovery across the western United States, he gave them specific instructions for observing and recording the natural world.

Although neither was trained as botanists or zoologists, their observations and descriptions of hundreds of new and unknown plants and animals were devoured by a nation highly interested in natural history and fascinated by new information and ideas. Lewis and Clark's lack of formal training was mitigated by the fact that natural history was a regular part of early education and most people had a working knowledge of its concepts and descriptive methods.

The Nature Study Movement

During the late Victorian Era, Liberty Hyde Bailey crafted the nature study movement. Bailey, a zoologist, served as director of the Cornell College of Agriculture and started a nature study program to begin interesting country students in better farming practices. This event heralded the beginning of the nature study movement, a time of great interest and passion for natural history study throughout the United States. In 1903, Anna Botsford Comstock succeeded Liberty Hyde Bailey as director of this program and, over the course of thirty years, fully developed the nature study movement. The nature study movement emphasized a direct appreciation of nature and its beauty instead of a more analytical study of the natural world. Comstock, the first female professor at Cornell, recognized a need for natural history education for all students. She believed fully in the importance of nature study for children and that "the reason why nature study has not yet accomplished its mission, as though core for most of the required work in our public schools, is that the teachers are as a whole are untrained in the subject." To correct this shortcoming, Comstock published the *Handbook of Nature-Study* in 1911. This large volume is chocked-full of lessons, photography, and appropriate readings. The creation of this study guide made nature study accessible across the country, and Comstock's book became a common text in most American classrooms.

Decline of Natural History Study

During this same time period, giants in nature writing such as Joseph Wood Krutch and Edwin Way Teale were publishing works to the great delight of the nation. Nature study societies such as the Audubon Nature Clubs were developed and the public was captivated by nature. Natural history knowledge was considered an important part of primary, secondary, and university educations and naturalists were well-respected members of university faculty.

The nature study movement continued until the nexus of three events: the rise of "hard sciences," migration from country to city and suburbs, and World War II all led to its decline. Comstock

was aware of these changes and indicated as much in the 24th edition of the *Handbook* in 1939. Her forward read:

Some readers of the Handbook have suggested that the new edition be oriented away from the nature-study approach, and be made instead to serve as an introduction to the natural sciences... But the nature-study approach has been preserved. The kernel of that method of treatment is the study of the organism in its environment, its relation to the world about it, and the features which enable it to function in its surroundings... The promising science of ecology is merely formalized nature-study... The truth is that nature-study is a science, and is more than a science; it is not merely a study of life, but an experience of life.

However, the march away from nature study and toward the modern scientific process had begun as scientists began to see the benefits of mathematical proofs, quantitative data, and statistical analysis in the natural sciences. Traditional natural history study focused on observation and description, both of which are subjective methods that depend greatly on the observation skills and descriptive writing of the observer. The experiential nature of natural history study made it impossible to duplicate observations. Observations of wildlife, weather events, even flowering of some plants are fleeting at best. As natural history has fallen out of favor in the academic community, so too has the title of naturalist. Because it has been used to refer not only to scientists and dedicated field naturalists, but also to people who study nature out of a love for its beauty and for no other purpose than to enjoy nature study, it has come to represent something weaker and softer than a “hard scientist” would like to claim. Soon, naturalists in many universities were thought of as old-fashioned, out of touch, and unnecessary lacking empirical though and scientific rigor.

In response to this trend, Marston Bates, in his book *The Nature of Natural History*, stated that although ecology is seen as “erudite and profound [sic] while natural history is popular and superficial ... as far as I can see, both labels apply to just about the same package of goods.” Bates believed that both experimental and observational methods were important. That all who studies life science should have a solid foundation in natural history upon which they build mathematical models and theoretical thought. Other natural historians rallied to create scientific rigor in natural history, one of the best examples being Joseph Grinnell, zoologist at the University of California at Berkley. Grinnell, in an effort to make field studies and field observation as meticulous and detailed as possible, developed a standard for field note-taking that is used to this day. Commonly called the Grinnell Method, it emphasizes a rigid form of note-taking that included categories for weather, location, habitat type, observations, species lists, and other required entries that would assist the naturalist in his or her field observations. It also benefits the naturalist who may read notes taken by another person to find the original field

location. These original field notes can be valuable in tracking the temporal distribution of species, determining climate change, or simply as a source of anecdotal information.

Despite these efforts, the hammer stroke finally fell on natural history during and after World War II. The race to produce atomic weapons and, after that, to be the first in space, stressed the importance of mathematics, physics, and other non-biological sciences. Biology moved from the field into the laboratory as new tools made cellular biology and microbiology more accessible. At the same time, the post WWII flight from the country to the city and suburbs cut a large percentage of the population's daily contact with nature.

Natural history: the study of species, their habits, niche, interrelationships and status has been formally conducted for hundreds of years. In the past 60 years we have seen a dramatic decrease in natural history education in the university system and society's knowledge of basic natural history. A few hardy academics still claim the title of "naturalist." Famed ecologist, E.O. Wilson, even named his autobiography *Naturalist*, but these people are few and far between. And, while natural history knowledge in our society has declined, there are still many amateur naturalists carrying on the tradition as best they can.

Knowing its beginnings, practice through the years, and why it has declined will help in the search for ways to bring it back to the classroom and our collective understanding. The Idaho Master Naturalist Program is doing its part to revive natural history study through sharing natural history knowledge and the practice of naturalist skills by its many trained naturalists.

Naturalist Skills and Tools

The ability to observe, to see keenly and then draw conclusions based on all elements noted is the most important skill a naturalist possesses. Honing this skill is a lifetime's work. Good observation is built upon a foundational knowledge of habitats, species, species behavior, and distribution. We see more because we understand more of what we are seeing. Therefore observational skill goes hand-in-hand with the ability to use a variety of tools available to the naturalist. These include the journal, field guides, identification keys, collection equipment, optics, etc. Understanding how we observe and the tools used in observation is the first part of a lifetime's journey as a naturalist.

Observation Skills

Naturalists learn everything they know through patient observation and study. Therefore, naturalists must hone their observation skills in order to collect as much information as possible. How we observe can be different, depending on the individual; however there are some methods that work for everyone:

- Increase your patience in order to slow down and watch.
- Pay close attention to your surroundings: who, what, when, where, & how.
- Be aware of animal reactions, plant locations, interactions between individuals, and any causal effects of note.
- Ask questions that can be answered through observation.
- Know yourself: what affects your concentration, what are you likely to overlook.
- Use available tools (journals, field guides, experts, etc.) to increase your knowledge and understanding.
- Be curious.
- Be ethical.

Field guides, dichotomous keys, and reference books

Identification of plants, animals, geologic formations, weather conditions, etc. is key to good natural history study. A naturalist is lost without this knowledge and, in turn, this knowledge is only as good as the resource the naturalist is using. Therefore, understanding how to use the variety of reference books available is critical to the naturalist's success. We are lucky to have hundreds of years of natural history information, gathered by early naturalist counterparts and present day observers, at our disposal. This information is organized in a variety of forms such as field guides, identification or dichotomous keys, reference books, professional journals, and nature writings. Each type serves a particular purpose.

Field guides

Field guides are books, usually written about particular taxa in a particular region. They typically contain short descriptions of each species in that taxa found in that region along with a drawing or photograph of the species and, perhaps a range map or range description. A classic example of a field guide is *Peterson's Field Guide to the Birds of Eastern and Central North America* by Roger Tory Peterson. Field guides can be organized in several ways such as by family, bloom time, flower color, range, etc. As their name implies, field guides are often used in the field and therefore must be small enough to fit into a backpack or back pocket.

Identification or Dichotomous Keys

An identification key, also known as a dichotomous key, is a tool used to identify a particular species. As the name implies, a dichotomous key works by giving two (or sometimes more) choices at each level. Choosing one alternative leads to the next level, narrowing the alternatives until the final choice leads to the species in question.

Dichotomous keys can be fairly simple, such as those found in many field guides, and may only contain a few of the many species found in an area. Or they may be complex keys (often called taxonomic keys) that include all species for a group and that require

knowledge of specialized terminology or examination of characteristics not always available in the field.

Reference books

Books that are either too large to take into the field or that contain copious amounts of information on a particular subject are often called reference books. These books are important to the naturalist's library as they offer the background information on species or ecosystems that cannot be obtained in a field guide.

Keeping a Journal

The journal is the most important tool a naturalist has. It contains all the observations he or she makes and, therefore, serves not only as an observation record but also as a reference tool. Journals assist in the learning process, scientific study, and personal expression. A journal is a reflection of the author's interests and writing style. Therefore, it must suit the needs and goals of the author. Most journals include daily entries; in fact "journal" is a derivation, through French, from the Latin word *diurnalis* which means "of a day." Often, journals that are kept for personal pleasure or interest may contain more than just observations of the day. They could also include poetry, illustrations, and other creative elements. Some journals may contain more illustrations than written observation. These are a delight to look at and are a great way to describe the natural world. If kept for research purposes, i.e. to document observations about a particular area, habitat, species, etc. for the purpose of scientific study the journal is usually more formal; including particular standard elements.

Why Keep a Field Journal?

A field journal is a way to codify the observations and revelations that arise from an outdoor field experience. It serves as a memory of natural history events, aids in observation, records behaviors and habits of flora and fauna, and documents unusual sightings or rare species. It is a way of making field observations empirical through the careful recording of events or it can be a creative outlet, using creative writing and drawing to explore our connection and relationship with the natural world.

The human memory is a capricious thing. What we think will be permanently etched on our mind is often easily forgotten. Our memory of events can also change due to a variety of influences, including our own bias. Because of this we cannot trust ourselves to remember events, measurements, or field markings with faithful accuracy. We must record observations at the moment they occur in order to consider them legitimate. This type of record keeping provides the opportunity to compare observations to ones made earlier, to consult field guides and other references, and to share these first-hand observations with our colleagues. It also gives us the benefit of reflecting on them at a later time; perhaps even drawing new conclusions about them.

Natural history study is based on this type of observation and attention to detail. Only through hours of patient watchfulness and proper record keeping can we learn about and understand the behaviors of birds, pollination of plants, or any of the myriad other actions and interactions of species. The journal aids in field study by allowing the observer an immediate place in which to record their observations while they are fresh and true. Writing and/or sketching require the observer to slow down and record all the actions or physical elements of a species or community, thereby evoking the attention to detail necessary to their craft. The observer often finds that they see details that would have normally been missed, such as hairs on a plant stem or a particular wing movement, if they had not been required to look closely at the organism and record the information immediately.

Our current collective knowledge of animals and plants is derived from hundreds of years of careful observations and journal keeping by professional and amateur natural historians and their subsequent publications. Although we have a basic, and sometimes thorough, understanding of many organisms, there are still millions of new species to discover and more to be found out about even the most prosaic species. Good record keeping will give us further insight into the ecology of these species.

As we are discovering new species, the journal provides the important element of proof of sighting. Documenting sightings of new or rare species is critical to give veracity to the event. Being able to show a field record of a species' location, actions, and characteristics gives credibility to the sighting, particularly if the observer could not collect a voucher specimen. If a voucher specimen exists then information about the collection location, conditions, collection method, and related events must accompany the specimen.

Many people, however, are not as interested in maintaining a journal to record observations related to a scientific interest. Their purpose instead is to explore their relationship with the natural world, to derive pleasure from interactions with flora and fauna, and to develop knowledge of and a connection to nature through journaling. Their journals may not follow a regimented format but may include a variety of observations, poetry, drawings, and other creative methods of exploration. These journals, while not always relevant for scientific purposes, are useful to their creators and often inspirational to others. These nature journals are not less than the formalized field journal but are different, vital ways to learn about nature.

Elements of a Field Journal: Seven Essential Entries

Whether you follow the strict Grinnell methodology or simply keep a periodical record of forays into natural communities, there are certain elements that should be included with each journal entry. These seven elements ensure records that are useful seven days or seven years from the time of entry. They are:

Date and Time

The first element of each journal entry should include the date and time of day. This allows the recorder to track phenological events, can be consulted when planning trips to see the same events, and can even be used to track changes in weather patterns. Without a date the journal entry loses a great deal of its usefulness.

Location and Route

The location and route of any trip should be as specific as possible. It should include the state, county or parish, nearest town or area (park, national forest, etc.), and the particular trail or natural area in which you are. Be as specific as possible because you or someone else may want to return to this area for future study. Record landmarks and GPS coordinates if possible.

Weather

Record temperature, precipitation, wind speed and cloud cover. These meteorological elements can dramatically affect the day's observations. A cool, cloudy day will yield few dragonflies and butterflies; a rainy night will increase salamander sightings. Certainly weather can affect collection methods and capture numbers. It is important to know why you are seeing what you are seeing and weather certainly impacts that.

Habitats

Any information that can be recorded about the plant community, forest type, geology, soils, and water sources of the area in which you are studying is important.

Vegetation

Describe the dominant plant species in each forest layer as well as any vegetative phenological events (what's blooming, what's in fruit, etc.) Use this, along with the habitat description, to "paint a picture" of the location that immediately gives an impression of the site.

General Commentary

Include in this section all other observations, information about your trip, descriptions of unusual activity, collecting methods, etc. Describe the events of the trip in good, descriptive prose.

Species List

A list of species should end your journal entry. Separate the species by major taxonomic groups; plants, mammals, herps, insects, etc. and include scientific names if possible. Using scientific names in this manner is the best way to learn them.

Field Notebooks and Field Journals

There are two components to a field journal system, the field notebook and the field journal. Both are integral parts of good record keeping. The field notebook is the primary recording device. In it are written all the observations as they occur, in chronological order. This information will later be entered in the field journal. The field notebook is an important companion of most field scientists and many amateur nature enthusiasts. Many use them as all-purpose recording devices and include not only their field notes but telephone numbers, meeting notes, and schedules. The field notebook is typically a small, notebook that fits into a pocket for ease of carrying. It is best not to use a larger notebook that must either be carried by hand, which can be cumbersome when needing quick access to binoculars, or in the backpack. An inexpensive 3" x 5" flip-top notepad is quite adequate. A pencil is the only implement that should be used to write in the notebook. Pencil markings will not run when wet, unlike ink, and can be used to write on waterlogged paper. Pencil is also an excellent drawing tool and can be used to create renderings of specimens for identification later.

The field journal is the permanent record of all field observations, research, and collections. In it, all the notes from the field notebook, along with ideas derived from those observations, are organized. The field journal is traditionally kept in a loose-leaf notebook with sections for daily observations, species records, and collection inventories (if applicable), however some people keep their journal in bound blank books, composition notebooks, and even computer files. Whatever format that meets the needs of the user is appropriate.

The field journal is where the seven essential entries are recorded for each day or field excursion. Date, location and route, weather, and habitat are entered first, forming a header for the rest of the entry. Next, description of the vegetation and general commentary take up the majority of the entry. These should be entered as full sentences, using good descriptive language. At the end of the entry are the species lists. They won't include all species in the study area (that would be difficult) however they do include all species of interest; species that are being studied, species that interact with the study subject, or species that are particularly noteworthy.

Field journals may also include species records. These are separate entries, kept in a separate section of the notebook, and are divided by species. Species records hold all the information known by the author about each species listed. They typically contain natural history and sighting dates for each species.

Field journals are traditionally kept on an annual basis with a fresh, new journal started at the beginning of each year. They are kept at home, or on longer field expeditions, back at camp or the hotel room. Because they are the permanent record of the field experience they should be

kept in good condition and never exposed to the rain, mud, and coffee stains that often mark the field notebook. Joseph Grinnell, former curator of the University of California Museum of Vertebrate Zoology, cautioned his students to write their field observations as soon as they day was done and before supper was taken. He believed that keeping a field journal required a certain level of discipline and that discipline would be beneficial in other parts of the naturalist's life.

Keeping a Journal for Science and Art

Now that we have discussed the usefulness of field journals, along with their basic components, let us explore more specific methods and applications. Let's take a closer look at the Grinnell Method (the style of choice for field biologists), the creative and expressive nature journal, and teaching nature journaling to children and adults.

The Grinnell Method

Joseph Grinnell (1877 – 1939) was the highly influential director of the University of California's Museum of Vertebrate Zoology. A great collector and naturalist, Grinnell's theory of ecological niche, published in 1924, became one of the organizing principles of ecology. Grinnell was highly influential in shaping the philosophy of the national park system and in the development of a system of field note taking that is still used today. Grinnell began his career during the time of increased scientific specialization and decreased interest in natural history study. In response to the need for scientific rigor in natural history Grinnell developed a disciplined, systematic approach to field note taking that he passed along to his students. This system, built around existing methods, consists of a tripartite record (Journal, Species Account, and Catalog) that Grinnell integrated into his field journal. Grinnell emphasized the value of the field journal as a tool of science, filled with first-hand observations, some of which may not be considered immediately useful but he felt may be useful in the future. He thought of the field journal as a tool of immediate use by the recorder and as a record for future study.

The following comments by Grinnell, regarding field notes, demonstrate his beliefs:

"The field collector is supplied with a separate-leaf notebook. He writes his records on the day of observation with carbon ink, on one side of the paper only. The floral surroundings are recorded, especially with respect to their bearing on the animal secured. The behavior of the animal is described and everything else which is thought by the collector to be of use in the study of the species is put on record at the time the observations are made in the field. The camera is as important a part of his outfit as the trap or gun. These field notes and photographs are filed so as to be as readily accessible to the student in the museum as are the specimens themselves.

At this point I wish to emphasize what I believe will ultimately prove to be the greatest value of our museum. This value will not, however, be realized until the lapse of many years, possibly a

century, assuming that our material is safely preserved. And this is that the student of the future will have access to the original record of faunal conditions in California and the west wherever we now work. He will know the proportional constituency of our faunae by species, the relative numbers of each species and the extent of the ranges of species as they exist today."

Recently, the University of California's Museum of Vertebrate Zoology made Grinnell's predictions a fact. They have begun a five-year undertaking called the Grinnell Resurvey Project. This wonderful validation of Joseph Grinnell's work involves resurveys of over two hundred of his original study locations, using Grinnell's meticulous notes as baseline data. They hope:

1. "To document changes in communities and the geographic range and relative abundance of species;
2. To relate observed dynamics to changes in habitat, climate and invasive species and, thereby, to understand what makes some species sensitive and others resilient to change;
3. To develop predictive models of how vertebrate diversity (at genetic, phenotypic, species & community levels) will respond to continuing change and efforts from the conservation community to protect diversity; and
4. To provide a new benchmark against which these predictions can be tested" (Museum of Vertebrate Zoology).

The three-part journal keeping method used by Joseph Grinnell offers a great deal to the modern student. It encourages the self-discipline necessary to good science, provides the all-important written record for field study, and increases the precision of the science being done. It also emphasizes structure and strict adherence to a standard method. The Grinnell Method, or a slightly modified version, is arguably the best method for all serious naturalists to use in their fieldwork.

The Nature Journal

The Nature Journal is in some ways similar and in others very different from the formal field journal we have just discussed. Often the nature journal is a personal creation that embodies the individual's interests in a creative and artistic way. The nature journal is creative, lacks the structure of the field journal, combines several methods and media such as drawing and sketching, painting, and creative writing. Certainly it can contain many of the elements of a field journal, but the main difference is the ability of the writer to explore nature through a variety of methods.

Because it is so tied to the interests and skill of the journal writer, the nature journal may often display a mix of creative and formal styles. It may include scientific and aesthetic observation. At times its writing may be creative and at others quite technical in nature. It may contain ideas developed through perception and others through analysis. The layout and presentation of ideas and observations is left up to the writer or artist and follows no set guidelines. The nature journal may offer opportunities for meditation and personal healing, for reflection and focus on a subject. Often it is a way for the observer to find their own voice and to find new ways to explore nature.

Glossary Terms and Definitions

- Field Journal - The permanent record of all field observations, research, and collections.
- Field Notebook - The primary recording device. In it are written all the observations as they occur, in chronological order. This information will later be entered in the field journal.
- Naturalist – One who studies natural history.
- Natural history - The study of nature, its components (living and non-living), and how they interact to each other, and their environment.
- Nature Journal - A creative journal, focusing on nature study that lacks the structure of the field journal. A nature journal combines several methods and media such as drawing and sketching, painting, and creative writing.

Study Questions

1. What is natural history?

The study of nature, its components (living and non-living), and how they interact to each other, and their environment.

2. Anna Botsford Comstock was a key figure in what movement?

The Nature Study Movement

3. What is a naturalist's most important skill?

Careful observation

4. What are some of the causes to the decline of natural history study in universities and primary education?

Urbanization of the population, emphasis on mathematics and “hard sciences,” emphasis on laboratory based science

5. What kinds of resources are commonly used by naturalists?

Field guides, dichotomous keys, reference books, journals

6. What are the seven essential entries in a field journal?

Date, Location and Route, Weather, Habitats, Vegetation, General Commentary, and Species List.

7. Why is it important to keep a field journal?

The journal is the most important tool a naturalist has. It contains all the observations he or she makes and, therefore, serves not only as an observation record but also as a reference tool. Journals assist in the learning process, scientific study, and personal expression.

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